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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/781,594	02/18/2004	Todd R. Burkey	XIOT.026PA	2698

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CRAWFORD MAUNU PLLC
1270 NORTHLAND DRIVE, SUITE 390
ST. PAUL, MN 55120

EXAMINER	
RIAD, AMINE	

ART UNIT	PAPER NUMBER
2113	

DATE MAILED: 08/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/781,594	BURKEY, TODD R.	
	Examiner	Art Unit	
	Amine Riad	2113	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *2/18/2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

Claims 1-31 have been presented for examination.

Claims 1-31 have been rejected.

Objections

Claims 3, 4, 5, 23, 24, 25 are objected to. All the claims mentioned before contain the expression "wherein the", Examiner strongly suggests to omit the article "the".

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title.

Claims 21-29 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The language of the claims raise a question as to whether the claims are directed merely to an abstract idea that would not result in a practical application producing a concrete, useful, and tangible result to form the basis of statutory subject matter under 35 U.S.C. 101.

In summary, Claims 21-29 recite " A program storage device readable by a computer, the program storage device tangibly embodying one or more programs of instructions executable by the computer ". The recited invention is computer software *per se*. A computer program is merely a set of instructions capable of being executed by a computer. The computer program itself is not a statutory process in that it does not include the computer-readable medium needed to realize the functionality of the

computer program. Thus, as currently recited, Claims 21-29 are directed to an abstract idea that does not produce a concrete, useful and tangible result.

Claims 21-29 are not limited to tangible embodiments. In view of applicant's disclosure, specification page 18, line 2 "**The process illustrated with reference to Figs. 1-5 may be tangibly embodied in a computer-readable medium or *carrier*, e.g.**", the medium is not limited to tangible embodiments, instead being defined as including both tangible embodiment for example [DVD-R, DVD+R, hard drive, memory] and intangible embodiments for example [digital and/or analog communication links, which may be electrical, optical, and/or wireless]. As such, the claim is not limited to statutory subject matter and is therefore non-statutory. Examiner strongly suggests using "A computer readable storage medium" instead of "A program storage device readable by a computer".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1,2,4,6,9,10,11,13,15,16,17,20,21,22,24,26,29,30,31are rejected under 35 U.S.C. 102(b) as being anticipated by Bond U.S. Patent 5,596,709.

In regard to claims 1,10,21, and 30,

Bond discloses a method for providing virtual space for handling storage device failures in a storage system, comprising:

- detecting a failure of a storage device; Abstract
- allocating space for rebuilding the failed storage device's data; Abstract
- rebuilding the failed storage device's data in the allocated space. Abstract

Examiner points out that the processor and the plurality of storage devices are both disclosed in Figure 1 as item 104 (the processor) and item 121, 122, 123, 124 (the storage devices)

In regard to claims 2, 11, and 22,

Bond discloses the method of claim 1 further comprising:

- replacing the failed storage devices with a replacement storage device; (Summary; "The storage units operate without parity protection until the failed unit is replaced ")
- migrating the data rebuilt in the allocated space to the replacement storage device.(Column 7; lines 28-31 "Once recovered, the physical storage location of that data is effectively **relocated** to the location")

In regard to claims 4, 13, and 24,

Bond discloses the method of claim 1, wherein the allocating space further comprises allocating unused space in storage devices of the storage system remaining after the failure of the storage device. (Column 6; lines 4-7 "Note that space available includes space used by back level versions of the data to be written, as well as unused space")

In regard o claims 6,17, 26, and 31

Bond discloses a method for providing virtual space for handling storage device failures in a storage system, comprising:

- preallocating virtual hot spare space for rebuilding data; (Column 3; lines 28-30 "In first alternate embodiment, spare areas of storage in each non-failing storage unit are allocated to the reconstructed data. The total of these spare areas constitute a virtual spare. As data is reconstructed, it is placed in the virtual spare storage unit")

- detecting a failure of a storage device; Abstract

- rebuilding the failed storage device's data in the preallocated virtual host spare space. Abstract

In regard to claim 9, 20, and 29

Bond discloses the method of claim 8, wherein the preallocated virtual hot spare space is mirrored, parity or striped over at least one physical storage device. (Column 3; lines 31-33 "As data is reconstructed, it is placed in the virtual sapre unit, and parity is maintained in the normal fashion")

In regard to claim 15,

Bond discloses the storage system of claim 10, wherein the processor is disposed in a controller (Figure 1; item 103 is the controller and item 104 is the processor).

In regard to claim 16,

Bond discloses the storage system of claim 10, wherein the processor is disposed in a management system. (Summary; "A **storage management mechanism** resident on the controller")

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3,5,7,8,12,14,18,19,23,25,27,28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bond U.S. Patent 5,596,709 in view of Nelson U.S. Patent 5,666,512.

In regard to claims 3, 12, and 23,

Bond discloses the method for providing virtual space for handling storage device failures as recited in parent claims.

Bond does not disclose replacing the failed storage device comprises hot swapping a new storage device for the failed storage device.

Nelson discloses that replacing the failed storage device comprises hot swapping a new storage device for the failed storage device. (Column 2; lines 29-33 "When the hot spare option is enabled, the RAID management system uses the hot spare to store user data in mirror storage while also guaranteeing that the hot spare space can be made available for rebuilding redundancy following a storage disk failure")

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate replacing the failed storage device by hot swapping a new storage device for the failed storage device of Nelson into the method for providing virtual space for handling storage device failures of Bond. A person of ordinary skill in the art would have been motivated to apply the hot swapping of Nelson because as Nelson discloses in the Background lines 51-53; 60 "Apart from data redundancy, some disk array storage systems enhance data availability by reserving an additional physical storage disk that can be substituted for a failed storage disk. These live storage disks are referred to as "**hot spares**" "

In regard to claims 5, 14, and 25,

Bond discloses the method for providing virtual space for handling storage device failures as recited in parent claims.

Bond does not disclose allocating space further comprises allocating space in hot spares for rebuilding data on the failed storage device.

Nelson discloses allocating space further comprises allocating space in hot spares for rebuilding data on the failed storage device. (Column 2; lines 29-31 "When the hot spare space is enabled, the RAID management system uses the hot spare space to store user") [Examiner considers when the RAID management system uses the hot spare space it allocates space for the usage]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate allocating space in hot spares for rebuilding data on the failed storage device of Nelson into the method for providing virtual space for

handling storage device failures of Bond. A person of ordinary skill in the art would have been motivated to apply the hot spare storages space allocation because as Nelson discloses in the Background lines 51-53; 60 "Apart from data redundancy, some disk array storage systems enhance data availability by reserving an additional physical storage disk that can be substituted for a failed storage disk. These live storage disks are referred to as "**hot spares**" "

In regard to claims 7,18, 27,

Bond discloses the method for providing virtual space for handling storage device failures as recited in parent claims 6.

Bond does not disclose placing into a general use storage pool any of the virtual hot spare space not used during rebuilding the failed storage devices' s data.

Nelson discloses placing into a general use storage pool any of the virtual hot spare space not used during rebuilding the failed storage devices' s data. (Abstract; "Until a disk fails, however, the memory manager uses the hot spare space to store user and redundant data while guaranteeing that the storage space can be used for rebuilding following a storage disk failure")

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate placing into general use storage pool any of the virtual spare not used during rebuilding the failed storage of Nelson into the method for providing virtual space for handling storage device failures of Bond. A person of ordinary skill in the art would have been motivated to apply placing into general use storage pool because as Nelson discloses in the Background lines 23-25 "Availability is

the ability to access data stored in the storage system and the ability to insure continued operation in the event of some failure" By placing into a general use, the hot spare space not used in rebuilding the failed storage, the availability of the system is maintained because access to data is still possible.

In regard to claims 8,19, and 28,

Bond discloses the method for providing virtual space for handling storage device failures as recited in parent claims.

Bond does not disclose setting aside for subsequent storage device failures any of the virtual hot spare space not used during rebuilding the failed storage device's data.

Nelson discloses setting aside for subsequent storage device failures any of the virtual hot spare space not used during rebuilding the failed storage device's data. (Column 2; lines 13-15 "All storage disks are used to store user data, while ensuring that an adequate quantity of space can be made available for reconstructing user data and restoring redundancy in the event of a disk failure") [Examiner considers the reconstruction of data happens during further failures other than the initial disk failure.]

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate setting aside for subsequent storage device failures any of the virtual hot spare space not used during rebuilding the failed storage device's data of Nelson into the method for providing virtual space for handling storage device failures of Bond. A person of ordinary skill in the art would have been motivated to set aside for subsequent storage device failures any of the virtual hot spare space not used during rebuilding the failed storage because as Nelson discloses in the Background lines 23-25

"Availability is the ability to access data stored in the storage system and the ability to insure continued operation in the event of some failure" By placing into a general use, the hot spare space not used in rebuilding the failed storage, the availability of the system is maintained because access to data is still possible.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S patent 6,751,136 pertains into failures and device replacement, but lacks the hot sparing, and U.S. patent 5,485,571 lacks storage space allocation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amine Riad whose telephone number is 571-272-8185. The examiner can normally be reached on 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Beausoliel can be reached on 571-272-3645. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197

AR
Amine Riad
Patent Examiner
8/16/2006